

## **REMARKS**

By the present amendment, claim 18 has been amended to incorporate the subject matter of claim 19, claim 19 has been amended to recite a different pleat density, claims 44 and 52 have been amended to correct informalities, and claim 52 has also been amended to set forth further details of the support screen. Upon entry of this amendment, claims 1-7, 10, 18-20, 22, 23, 25, 26, 39-46 and 52-65 will be pending in the application.

### ***Claim Objections***

Claims 44 and 52 have been amended as suggested by the Examiner to correct the indicated informalities.

### ***Claim Rejections - 35 U.S.C. § 102***

Claims 18-19 have been rejected as being anticipated by U.S. Patent No. 6,422,395 to Verdegan. Claim 18 has been amended to incorporate the subject matter of claim 19 and now sets forth that the filter media has a pleat density of about 12 or more pleats per inner diameter inch. Claim 19 has been amended to set forth that the filter media has a pleat density of about 13 pleats per inner diameter inch. Verdegan teaches that its filter media has "preferably at least five pleats per inch" along its inner circumference and "further preferably eleven pleats per inch" along its inner circumference. Accordingly, this reference does not show or suggest the pleat density now set forth in claim 18 and/or claim 19.<sup>1</sup>

### ***Claim Rejections - 35 U.S.C. § 103***

Claims 1-3, 10, 52-58 and 64-65 have been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan in view of U.S. Patent No. 4,464,263 to Brownell and U.S. Patent No. 3,505,794 to Nutter. Claims 4-5 have been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan, U.S. Patent No. 4,464,263 to Brownell, U.S. Patent No. 3,505,794 to Nutter, and further in view of U.S. Patent No. 3,216,578 to Wright and U.S. Patent No. 6,454,870 to Castellanos. Claim 6 has been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan, U.S. Patent No. 4,464,263 to Brownell, U.S. Patent No. 3,505,794 to Nutter, U.S. Patent No. 3,216,578 to Wright, U.S. Patent No. 6,454,870 to Castellanos, and further in view of U.S. Patent No. 4,735,720 to Kersting. Claim 7 has been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan, U.S. Patent No. 4,464,263 to Brownell, U.S. Patent No. 3,505,794 to Nutter and further in view of U.S. Patent No. 4,735,720 to Kersting.

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1. Moreover, as explained below, Verdegan does not teach an exoskeleton for its filter media 70. (It does for the prior art filter media 30, but this filter media does not possess the specified pleat density.)

Verdegan is directed towards providing a fluid filter with an extended life and, to this end, teaches a filter element 70 having five characteristics expressly in combination, namely:

1. filter media 72 has a greater affinity for the fluid than for the contaminants;<sup>2</sup>
2. filter media 72 is composed of fibers having a defined surface area ratio providing fewer attachment sites for contaminants;<sup>3</sup>
3. filter media 72 has a specified thickness;<sup>4</sup>
4. face area is maximized by pleating the filter media 72;<sup>5</sup> and
5. screen support layers 80 and 82 (formed by criss-crossed wires) sandwich the surface filter media 72 therebetween.<sup>6</sup>

The Examiner appears to contend that Verdegan teaches an exoskeleton 40 for its filter element 70. However, the perforated metal liner 40 ("engaging and supporting the inner pleat tips") is disclosed as being part of the prior art filter element 30. Quite significantly, such an "exoskeleton" is not part of the filter element 70. Instead, it quite

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2. The work of adhesion between the filter media and the contaminants is less than the work of adhesion between the filter media and the fluid, and the filter media is preferentially wetted by the fluid relative to the contaminants;

3. This facilitates cleansing backwash of the cleanable reusable filter by cleansing fluid

4. The thickness of the filter media is preferably 0.7 to 2.0 millimeters (about 0.025 to 0.075 inch) and further preferably about 0.7 millimeter (about 0.025 inch).

5. The filter media has preferably at least five pleats per inch along its inner circumference, and further preferably eleven pleats per inch along its inner circumference.

6. This prevents the collapse of the thin surface filter media during filtration and during backwash.

Verdegan notes that "[i]n further embodiments, one or both of screens 80 and 82 may be eliminated if the media has sufficient structural strength, examples being laminated filter media, stiffer layer filter media, resin impregnated filter media, and the like."

specifically depends upon its upstream and downstream support layers 80 and 82 to provide "sufficient structural strength."

Claims 1-7, claim 64 and claim 65 sets forth that the filtration layer is sandwiched between non-cellulose-fiber and non-woven polymer inner and outer layers and that the exoskeleton comprises a support screen bonded to peaks of the pleats and providing a tight array of attachment points so that the filter media is sufficiently supported without having woven-mesh endoskeleton support layers. Claims 10 and 52-58 set forth that the filter media is formed from woven-mesh-free layers and that the exoskeleton support structure is attached to the peaks in such a manner that the filter media is sufficiently supported without cellulose-fiber and woven-mesh endoskeleton support layers.

The Examiner contends that it would have been obvious to replace the Verdegan perforated metal liner 40 with the molded foam shield shown in Brownell "in order to provide an alternative and as an effective supporting sleeve/liner for the pleated filter media." However, as noted above, the Verdegan filter element 70 does not include the metal liner 40, as it relies on the endoskeleton support layers 80 and 82 to "sufficiently support" the filter media.

The Examiner also contends that it would have been obvious to replace the screen support layers 80 and 82 with the allegedly non-cellulose-fiber and non-woven polymer filter layers shown in Nutter "to provide a filter element which would not corrode" and that would also be "light-weight compared to its metallic counterparts." However, such replacement would appear to destroy stated objectives of the Verdegan invention, particularly, for example, the filter media having great affinity for the fluid, the defined/desired surface area, minimal attachment sites, filter media thickness, and/or the support layers 80 and 82. Moreover, it is unclear from the applied prior art whether such a filter media would be compatible with the procedures necessary to form the foam shield shown in Brownell.<sup>7</sup>

Claims 39-40 and 43-46 have been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan in view of U.S. Patent No. 6,206,205 to Durre and U.S. Patent No. 4,464,263 to Brownell. Claims 41-42 have been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan, U.S. Patent No. 6,206,205 to Durre, U.S. Patent No. 4,464,263 to Brownell and further in view of U.S. Patent No. 5,599,449 to Gnam. These claims set forth that the support screen comprises a sheet of screen material having a length approximately equal to the circumferential dimension of the filter media plus a seam allowance, that the sheet of screen material has lateral edges joined

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7. Whatever teachings Wright and Castellanos may or may not offer regarding screen mesh, and/or whatever teachings Kresting may or may not offer regarding side seaming, they do not cure the discrepancies in the proposed Verdegan/Brownell/Nutter combination.

together at a side seam, and that the support screen is thermally bonded to each of the peaks thereby exoskeletonally supporting the pleats in a spaced and non-collapsed condition.

The Examiner contends that it would have been obvious to replace the metal liner 40 shown in the Verdegan filter element 30 with the support tube shown in Durre “to provide an alternative design and improved exoskeleton which would provide sufficient support for the pleats of the filter media” and “at the same time, provide a structure which is less expensive to manufacture.” The Examiner admits that his proposed Verdegan/Durre combination does not show “thermal bonding” of the support screen to the filter peaks, but points to Brownell to make up for this discrepancy. Specifically, he says it would have been obvious to incorporate the Brownell bonding method to prevent “collapse and movement of the pleats of the filter media, without the added expense of adhesives.”

It is noted that in the Durre support tube, “the seam region 50 is not welded or bent” and “[t]he side edges merely abut at this location.” Accordingly, Durre does not show or suggest a “seam allowance.”<sup>8</sup> Additionally or alternatively, Brownell teaches liquid plastic which foams and solidifies around the filter peaks - it does not show or suggest thermal bonding. As for Gnam, its lateral edges 46 and 48 are purposely left unattached “in order to be able to expand the filter element elastically for the purpose of fitting in a circumferential groove.”

Claim 52 has been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan in view of U.S. Patent No. 4,464,263 to Brownell. Claim 52 now sets forth that the exoskeleton comprising a support screen having a first set of cords extending in a first direction, a second set of cords extending in a second direction and intersecting with the first set of cords, and openings defined therebetween. Neither Verdegan nor Brownell teaches such a support screen, and they certainly do not teach such a support screen non-adhesively bonded to each of the radially inward peaks of the pleats.

Claims 20, 22 and 25 have been rejected as being obvious over U.S. Patent No. 4,735,720 to Kersting. Claim 23 has been rejected as being obvious over U.S. Patent No. 4,735,720 to Kersting in view of U.S. Patent No. 4,464,263 to Brownell. Claims 20, 22 and 23 set forth a side seam comprising an adhesive bead which encapsulates all of the layers of the distal ends of the end pleats and which extends radially inward between the respective sidewalls of the end pleats. Claims 26 sets forth a side seam comprising an adhesive bead which extends radially inward between the endmost sidewalls of the end pleats and circumferentially between endmost radially outward peaks of the two end

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8. In fact, Durre is specifically directed to applications requiring moderately high collapse strength (on the order of 300 psi to 600 psi) where the thickness of the support tube “does not lend itself to an overlapped or lock seam type of joint.”

pleats. Kersting, in contrast, does not teach a bead, but rather teaches a bar-shaped mass which is formed by introducing a liquid resin into a mold cavity.<sup>9</sup>

Claims 26 and 59-61 have been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan in view of U.S. Patent No. 3,216,578 to Wright and U.S. Patent No. 4,464,263 to Brownell. Claims 62-63 have been rejected as being obvious over U.S. Patent No. 6,422,395 to Verdegan, U.S. Patent No. 3,216,578 to Wright, U.S. Patent No. 4,464,263 to Brownell, and further in view of U.S. Patent No. 5,599,449 to Gnam. These claims set forth that the exoskeleton support structure comprises a support screen that is non-adhesively attached to the peaks. The support screen has a first set of cords extending in a first direction, a second set of cords extending in a second direction and intersecting with the first set of cords, and openings defined therebetween. The cords are attached to each of the radially-outer peaks or each of the radially-inner peaks thereby exoskeletonally supporting the pleats in an appropriately spaced and non-collapsed condition.

The Examiner contends that it would have been obvious to replace the Verdegan perforated metal liner 40 (in the filter element 30) with the Wright screen. The Examiner admits that his proposed Verdegan/Wright combination does not result in a support screen being non-adhesively attached to the peaks, but he uses Brownell to remove this shortcoming. Specifically, the Examiner concludes that it would have been obvious to use the Brownell "non-adhesive attachment method" to attach a Wright-like screen replaced in the Verdegan filter element 30. However, the Brownell method of attachment involves filling a mold with a plastic material, suspending the peaks of the filter pleats adjacent the plastic material, foaming the plastic material and expanding its volume so that it contacts the filter pleats, and then solidifying the plastic material to embed the pleats therein. It is difficult (or, perhaps more accurately, impossible) to imagine how such an attachment method could be employed with a Wright-like screen. In any event, the applied art certainly does not provide an indication that this "non-adhesive attachment method" could or should be used on screen-like structures.

### ***Conclusion***

In view of the foregoing, this application is now believed to be in a condition for allowance and an early action to that effect is earnestly solicited.

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9. The advantage of applicant's bead over the Kersting mass is that a bead can be formed from any appropriate adhesive which can be controllably applied to the seam and a mold is not necessary.

Respectfully submitted,

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